

Appendix 13a

Site Photos

– Small Pond Bog

Site Photographs – Small Pond Bog



Photo 1 View of Small Pond Bog (looking east)



Photo 2 View of Small Pond Bog (looking southeast)

Site Photographs – Small Pond Bog



Photo 3 View of Small Pond Bog (looking southeast)



Photo 4 View of drainage stream flowing towards the Residential Subdivision

Appendix 13b

Sample Coordinates

– Small Pond Bog

Sample Coordinates - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Coordinates	
	Easting	Northing
SURFACE SOIL		
BS242	0675219	6149716
BS243	0675231	6149744
BS244	0675273	6149764
BS256	0675158	6149940
SEDIMENT		
SED-20	-	-
SED-21	-	-
SED-22	-	-
SED-23	-	-
SED-24	-	-
SED-59	0675141	6149675
SED-60	0675115	6149713
SED-61	0675235	6149735
SED-62	0675243	6149840
SED-63	0675322	6149779
SED-64	0675076	6149725
BENTHIC		
BENTHIC-5	0675193	6149668

Notes:

"-" = Coordinates not recorded

Appendix 13c

Soil Vapour Concentrations

– Small Pond Bog

Sample Tipping Results - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (mbgs)	Hydrocarbon Odour	Soil Vapour Concentration (ppm)
SURFACE SOIL			
BS242	0.00-0.08	No	10.2
BS243	0.00-0.17	Fuel odor	4.9
BS244	0.00-0.20	No	3.2
BS256	-	-	0.5
SEDIMENT			
SED-20	-	-	1.9
SED-21	-	-	5.2
SED-22	-	-	2
SED-23	-	-	1.5
SED-24	-	-	8.5
SED-57	-	-	-
SED-59	-	No	-
SED-60	-	No	-
SED-61	-	No	-
SED-62	-	No	-
SED-63	-	No	-
SED-64	-	No	-

Notes:

"-" = Value not recorded

Appendix 13d

Laboratory Analytical Results Summary Tables

– Small Pond Bog

Table 13.1 Results of Laboratory Analysis of TPH/BTEX in Soil - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (m)	Benzene	Toluene	Ethylbenzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₀ -C ₂₁ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH - Tier I ²	Resemblance
	RDL	0.03	0.03	0.03	0.05	3	15	15	20	-
	RDL ³	0.1	0.1	0.1	0.3	10	15	15	20	-
	Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
	Tier I RBSLs ¹	0.16	14	58	17	-	-	-	140	-
SURFACE SAMPLES										
BS242	0.00 - 0.08	<0.03	<0.03	<0.03	<0.05	<3	88	35	120	WFO
BS244	0.00 - 0.20	<0.03	<0.03	<0.03	<0.05	<3	93	250	340	OP F/L
BS256 ³	Not recorded	<0.1	<0.1	<0.1	<0.3	<10	6,900	570	7,500	WFO

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable groundwater and coarse grained soil, fuel oil impacts (September, 2003)

2 = Modified TPH - Tier I does not include BTEX

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

WFO=Weathered fuel oil; OP F/L=One product in fuel/lube oil range

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and fuel oil impacts

Table 13.2 Results of Laboratory Analysis of PCBs in Soil - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)
	RDL	0.05
	Units	mg/kg
	Criteria ¹	1.3
SURFACE SAMPLES		
BS244	0.00 - 0.20	<0.05
BS256	Not recorded	<0.05

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

**Table 13.3 Results of Laboratory Analysis of Available Metals in Soil - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Criteria ¹	SURFACE SAMPLES
				BS256
Aluminum	10	mg/kg	-	8,700
Antimony	2	mg/kg	20	<2
Arsenic	2	mg/kg	12	<2
Barium	5	mg/kg	500	22
Beryllium	2	mg/kg	4	<2
Bismuth	2	mg/kg	-	<2
Boron	5	mg/kg	-	<5
Cadmium	0.3	mg/kg	10	<0.3
Chromium	2	mg/kg	64	13
Cobalt	1	mg/kg	50	<1
Copper	2	mg/kg	63	13
Iron	50	mg/kg	-	4,200
Lead	0.5	mg/kg	140	10
Lithium	2	mg/kg	-	<2
Manganese	2	mg/kg	-	13
Mercury	0.1	mg/kg	6.6	0.2
Molybdenum	2	mg/kg	10	<2
Nickel	2	mg/kg	50	4
Rubidium	2	mg/kg	-	<2
Selenium	2	mg/kg	1	<2
Silver	0.5	mg/kg	20	<0.5
Strontium	5	mg/kg	-	16
Thallium	0.1	mg/kg	1	<0.1
Tin	2	mg/kg	50	<2
Uranium	0.1	mg/kg	23	3.1
Vanadium	2	mg/kg	130	4
Zinc	5	mg/kg	200	14

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

Table 13.4 Results of Laboratory Analysis of TPH/BTEX in Sediment - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Benzene	Toluene	Ethyl Benzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₀ -C ₂₁ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH ²	Resemblance
RDL	0.03	0.03	0.03	0.05	3	15	15	20	-
RDL ³	0.1	0.1	0.1	0.3	10	15	15	20	-
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
Criteria ¹	-	-	-	-	-	-	-	1,500	-
SEDIMENT									
SED-20	<0.03	<0.03	<0.03	<0.05	<3	15,000	1,300	16,000	WFO
SED-21	<0.03	<0.03	<0.03	<0.05	<3	2,400	280	2,700	WFO
SED-22	<0.03	<0.03	<0.03	<0.05	<3	<15	<15	<20	-
SED-23	<0.03	<0.03	<0.03	<0.05	<3	500	100	600	WFO
SED-24	<0.03	<0.03	<0.03	<0.05	<3	6,400	320	6,700	WFO
SED-59	<0.03	<0.03	<0.03	<0.05	<3	1,600	360	2,000	OP F/L, WFO
SED-60	<0.03	<0.03	<0.03	<0.05	5	1,600	83	1,600	OP F/L, WFO
SED-61	<0.03	<0.03	<0.03	<0.05	<3	240	71	310	OP F/L, WFO
SED-62	<0.03	<0.03	<0.03	<0.05	<3	<15	80	80	DNR
SED-63	<0.03	<0.03	<0.03	<0.05	<3	<15	<15	<20	-
SED-64 ³	<0.1	<0.1	<0.1	<0.3	58	<15	190	240	LO

Notes:

1 = Ontario Ministry of Environment Guidelines for oil and grease in Freshwater Sediment. There are no federal or provincial guidelines for TPH or BTEX in marine sediment.

2 = Modified TPH - Tier I does not include BTEX

3 = Elevated RDL

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

OP F/L=One product in the fuel/lube oil range; DNR = Does not resemble petroleum products

WFO = Weathered fuel oil fraction; LO = Lube oil fraction

Table 13.5 Results of Laboratory Analysis of PCBs in Sediment - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Polychlorinated Biphenyls (PCBs)
RDL	0.05
Units	mg/kg
Criteria ¹	0.0341
Criteria ²	0.277
SEDIMENT	
SED-20	0.68
SED-21	<0.05
SED-22	<0.05
SED-23	<0.05
SED-24	<0.05
SED-59	<0.05
SED-60	<0.05
SED-61	<0.05
SED-62	<0.05
SED-63	<0.05
SED-64	0.4

Notes:

1 = CCME Interim Sediment Quality Guidelines (ISQGs) for freshwater sediment (2002)

2 = CCME Probable Effects Levels (PELs) for freshwater sediment (2002)

RDL = Reportable Detection Limit

< = Not detected above RDL noted

Shaded = Value exceeds CCME ISQG

Shaded/ Bold = Value exceeds CCME ISQG and CCME PEL

Table 13.6 Results of Lab Analysis of Available Metals in Sediment - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	Units	Criteria ¹	Criteria ²	SEDIMENT										
					SED-20	SED-21	SED-22	SED-23	SED-24	SED-59	SED-60	SED-61	SED-62	SED-63	SED-64
Aluminum	10	mg/kg	-	-	16,000	11,000	17,000	3,500	12,000	10,000	10,000	1,300	5,300	3,600	8,200
Antimony	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Arsenic	2	mg/kg	5.9	17.0	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Barium	5	mg/kg	-	-	65	40	55	13	42	25	20	<5	22	9	35
Beryllium	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bismuth	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Boron	5	mg/kg	-	-	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	0.3	mg/kg	0.6	3.5	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	2	mg/kg	37.3	90.0	26	21	30	6	21	16	19	3	10	7	23
Cobalt	1	mg/kg	-	-	10	6	11	3	7	7	4	<1	1	4	7
Copper	2	mg/kg	35.7	197	29	18	16	5	19	18	13	<2	14	5	57
Iron	50	mg/kg	-	-	15,000	9,900	20,000	5,500	18,000	22,000	10,000	2,000	4,200	7,000	32,000
Lead	0.5	mg/kg	35.0	91.3	16	6.3	4.9	12	8.2	5.8	6.5	1.6	4.5	2.1	42
Lithium	2	mg/kg	-	-	11	6	13	2	7	5	7	<2	<2	4	9
Manganese	2	mg/kg	-	-	200	140	330	73	180	240	81	22	24	110	240
Mercury	0.1	mg/kg	0.17	0.486	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Molybdenum	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	6
Nickel	2	mg/kg	-	-	21	14	24	4	14	10	11	2	6	7	26
Rubidium	2	mg/kg	-	-	10	6	14	<2	6	4	5	<2	3	<2	9
Selenium	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Silver	0.5	mg/kg	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Strontium	5	mg/kg	-	-	35	26	39	7	22	18	12	5	15	7	17
Thallium	0.1	mg/kg	-	-	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	2	mg/kg	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Uranium	0.1	mg/kg	-	-	2.6	2.1	0.6	0.3	2.7	4.2	1.8	<0.1	1.4	0.2	6.0
Vanadium	2	mg/kg	-	-	30	21	34	13	25	22	25	5	6	10	20
Zinc	5	mg/kg	123	315	95	45	53	23	97	35	23	6	19	15	46

Notes:

1 = CCME Interim Sediment Quality Guidelines (ISQGs) for freshwater sediment (2002)

2 = CCME Probable Effects Levels (PELs) for freshwater sediment (2002)

RDL = Reportable Detection Limit

< = Not detected above RDL noted

"-" = indicates value is not available or does not apply

Shaded = Value exceeds CCME ISQG

Table 13.7 Results of Laboratory Analysis of TOC and Grain Size in Sediment - Small Pond Bog
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	Units	SEDIMENT					
		SED-20	RDL	SED-22	RDL	SED-24	RDL
Organic Carbon (TOC)	g/kg	110	2	8	0.2	84	1
<-4 Phi (16 mm)	%	100	0.1	100	0.1	100	0.1
<-3 Phi (8mm)	%	100	0.1	100	0.1	100	0.1
<-2 Phi (4mm)	%	100	0.1	100	0.1	100	0.1
<-1 Phi (2mm)	%	97	0.1	83	0.1	100	0.1
0 Phi (1mm)	%	81	0.1	81	0.1	98	0.1
<+1 Phi (0.5 mm)	%	71	0.1	80	0.1	91	0.1
<+2 Phi (0.25 mm)	%	64.0	0.1	78	0.1	81	0.1
<+3 Phi (0.12 mm)	%	58	0.1	75	0.1	68	0.1
<+4 Phi (0.062 mm)	%	54	0.1	70	0.1	49	0.1
<+5 Phi (0.031 mm)	%	50	0.1	60	0.1	33	0.1
<+6 Phi (0.016 mm)	%	38	0.1	44.0	0.1	20.0	0.1
<+7 Phi (0.0078 mm)	%	24	0.1	28	0.1	12	0.1
<+8 Phi (0.0039 mm)	%	19	0.1	23	0.1	9	0.1
<+9 Phi (0.0020 mm)	%	14	0.1	16	0.1	6	0.1
Gravel	%	3.5	0.1	17	0.1	0	0.1
Sand	%	42	0.1	13	0.1	50	0.1
Silt	%	35	0.1	47	0.1	40	0.1
Clay	%	19	0.1	23	0.1	9	0.1

Notes:

RDL = Reportable Detection Limit

Appendix 14a

Site Photos

– POL Compound

Site Photographs – POL Compound



Photo 1 POL Compound (looking north at MW22)



Photo 2 Roadway at POL Compound (looking east)

Site Photographs – POL Compound



Photo 3 Gully at the POL Compound (looking west)



Photo 4 Gully at POL Compound (looking southwest)

Site Photographs – POL Compound



Photo 5 Looking at the Old Dump Pond from the POL Compound (looking southeast)



Photo 6 Bitumen deposit at POL site

Site Photographs – POL Compound



Photo 7 Metal debris at the POL Compound



Photo 8 Sample label

Appendix 14b

Sample Coordinates

– POL Compound

Sample Coordinates - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Coordinates	
	Easting	Northing
TEST PITS		
TP-140	0674980	6149627
TP-141	0674954	6149613
TP-142	0674970	6149603
SURFACE SAMPLES		
BS39	0674975	6149537
BS40	0674972	6149538
BS41	0674951	6149569
BS42	0674940	6149576
MONITOR WELLS		
MW-21	0674948	6149614
MW-22	0674958	6149577
MW-23	0675007	6149598
MW-24	0674967	6149605

Appendix 14c

Test Pit and Monitor Well Records

– POL Compound



FIELD TEST PIT RECORD

JOB NUMBER: 1044856
 TEST PIT NO.: TP110
 MACHINE TYPE: _____
 TEMPERATURE: _____

JOB NAME: _____
 TEST PIT SIZE: _____
 CONTRACTOR: _____
 WEATHER: _____

DATE: July 27, 09
 ELEVATION: _____
 DATUM: _____

DEPTH		SOIL DESCRIPTION	SAMPLES		IN SITU DENSITY TEST		REMARKS
FROM	TO		NO.	DEPTH	NO.	DEPTH	
0	0.3	black w/ly coarse sand with some black coarse sand	BS1	0.2 0.3			dry @ b.r. Black sand resembles asphalt
LOCATION SKETCH			WATER CONDITIONS IN TEST PIT:				
			<input checked="checked" type="checkbox"/> Test Pit Dry.				

JOB NO.: _____
 TEST PIT NO.: _____
 ENGINEER: _____



SHEET: _____ OF _____

FIELD TEST PIT RECORD

JOB NUMBER: 1044856
TEST PIT NO.: TP141
MACHINE TYPE: _____
TEMPERATURE: _____

JOB NAME: _____
TEST PIT SIZE: _____
CONTRACTOR: _____
WEATHER: _____

DATE: July 27, 09
ELEVATION: _____
DATUM: _____

DEPTH		SOIL DESCRIPTION	SAMPLES		IN SITU DENSITY TEST		REMARKS
FROM	TO		NO.	DEPTH	NO.	DEPTH	
0	0.2	brown medium silty sand with some black tan like coarse sand	BS1	0.1 0.2			lye w. r. Depositive metal

LOCATION SKETCH _____

WATER CONDITIONS IN TEST PIT:
 Test Pit Dry.

JOB NO.: _____
TEST PIT NO.: _____
ENGINEER: _____



SHEET: _____ OF _____

FIELD TEST PIT RECORD

JOB NUMBER: 1244856
 TEST PIT NO.: TP1413
 MACHINE TYPE: _____
 TEMPERATURE: _____

JOB NAME: _____
 TEST PIT SIZE: _____
 CONTRACTOR: _____
 WEATHER: _____

DATE: July 27, 09
 ELEVATION: _____
 DATUM: _____

DEPTH		SOIL DESCRIPTION	SAMPLES		IN SITU DENSITY TEST		REMARKS
FROM	TO		NO.	DEPTH	NO.	DEPTH	
0	0.3		dark brown to black organic and fine sand	B51	0.2 0.3		
LOCATION SKETCH			WATER CONDITIONS IN TEST PIT:				
			gw @ 0.1m <input type="checkbox"/> Test Pit Dry.				

JOB NO.: _____
 TEST PIT NO.: _____
 ENGINEER: _____

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-7-09 WATER LEVEL 0.26m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Dark brown, SAND (SP); some cobbles		▼	SS	1	229	6/16	0		2.3	1	
1		Light and dark grey, BEDROCK		RC	2	100%		0		-	-		
2				RC	3	100%		0		-	-		
4				RC	4	100%		0		-	-		
5		End of Borehole											
6													
7													
8													
9													
10													

DRAFT



MONITOR WELL RECORD

BOREHOLE No. MW22
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-7-09 WATER LEVEL 3.16m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Light to dark grey and pink, BEDROCK				mm							0.61 m STICK UP CAST IRON WELL HEAD
1		Pink and grey, trace bright green, BEDROCK		RC	1	100%		0	-	-			BACKFILL BENTONITE
2		Light to dark grey and pink, BEDROCK		RC	2	100%		1	-	-			50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3													
4													
5		End of Borehole											END CAP
6													
7													
8													
9													
10													

DRAFT

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-7-09 WATER LEVEL 0.85m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Pink and grey, BEDROCK				mm							0.61 m STICK UP CAST IRON WELL HEAD
1				RC	1	100%		0	-	-			BENTONITE
2				RC	2	100%		0	-	-			50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3				RC	3	100%		0	-	-			END CAP
4													
5		End of Borehole											
6													
7													
8													
9													
10													

DRAFT

MONITOR WELL RECORD

BOREHOLE No. MW24
 PAGE 1 of 1
 PROJECT No. 121410103
 DRILLING METHOD _____
 SIZE _____
 DATUM N/A

CLIENT Newfoundland and Labrador Department of Environment and Conservation
 PROJECT Phase II/III ESAs, HHERA and RAP/RMP
 LOCATION Former U.S. Military Site and Residential Subdivision, Hopedale, NL
 DATES (mm-dd-yy): BORING 9-8-09 WATER LEVEL 0.23m 10-15-09

DEPTH (m)	ELEVATION (m)	DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				HYDROCARBON ODOUR	APPARENT MOISTURE CONTENT	PID (ppm)	TPH (ppm)	WELL CONSTRUCTION DETAILS
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD %					
0		Dark brown, SAND (SP); some cobbles											0.61 m STICK UP CAST IRON WELL HEAD
		Pink, white and grey, BEDROCK		SS	1	76	3/102	1		38.3	21000		BACKFILL BENTONITE
1				RC	2	100%		0		-	-		
2		Light to dark grey, BEDROCK		RC	3	100%		0		-	-		50 mm DIAMETER No. 10 SLOT PVC SCREEN IN No. 2 SILICA SAND PACK
3													
4													END CAP
5		End of Borehole											
6													
7													
8													
9													
10													

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Appendix 14d

Soil Vapour Concentrations

– POL Compound

Sample Tipping Results - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (mbgs)	Hydrocarbon Odour	Soil Vapour Concentration (ppm)
TEST PITS			
TP140-BS1	0.2-0.3	No	2.9
TP141-BS1	0.1-0.2	Asphalt odour	85.0
TP141-BS2	0.2-0.3	Asphalt odour	-
TP142-BS1	0.2-0.3	Yes	57.0
SURFACE SAMPLES			
BS39	0.00-0.08	No	0.3
BS40	0.00-0.14	No	0.9
BS41	0.00-0.10	No	0.3
BS42	0.00-0.13	No	0.4

Notes:

"-" = Value not recorded

Appendix 14e

Laboratory Analytical Results Summary Tables

– POL Compound

Table 14.1 Results of Laboratory Analysis of TPH/BTEX in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (m)	Benzene	Toluene	Ethylbenzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₀ -C ₂₁ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH - Tier I ²	Resemblance
RDL (Test Pits, Surface Samples)		0.03	0.03	0.03	0.05	3	15	15	20	-
RDL (Monitor Wells)		0.03	0.03	0.03	0.05	3	15	150	200	-
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
Tier I RBSLs ¹		0.16	14	58	17	-	-	-	690	-
TEST PITS										
TP140-BS1	0.2 - 0.3	<0.03	<0.03	<0.03	<0.05	<3	650	1,800	2,400	OP F, LO
TP142-BS1	0.2 - 0.3	<0.03	<0.03	<0.03	0.5	67	2,600	10,000	13,000	FO, LO
SURFACE SAMPLES										
BS42	0.00 - 0.13	<0.03	<0.03	<0.03	<0.05	<3	1,700	10,000	12,000	WFO, LO
MONITOR WELLS										
MW21-SS1	0.00 - 0.08	<0.03	<0.03	<0.03	<0.05	<3	250	1,100	1,300	WFO, LO
MW24-SS1	0.00 - 0.10	<0.03	<0.03	<0.03	<0.05	36	5,500	15,000	21,000	WFO, LO

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable groundwater and coarse grained soil, lube oil impacts (September, 2003)

2 = Modified TPH - Tier I does not include BTEX

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

FO = Fuel oil fraction; WFO = Weathered fuel oil; LO = Lube oil fraction; DNR = No resemblance to petroleum products; OP F = One product in the fuel oil range

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and lube oil impacts

Table 14.2 Results of Laboratory Analysis of TPH fractionation in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	Units	Tier I RBSLs ¹	TEST PITS
				TP141-BS1
Sample Depth				0.1 - 0.2
Benzene	0.04	mg/L	0.16	<0.04
Toluene	0.03	mg/L	14	1.2
Ethylbenzene	0.03	mg/L	58	<0.03
Xylenes	0.05	mg/L	17	0.15
Modified TPH - Tier II ²	200	mg/L	690	25,000
> C8-C10 Aromatic	0.1	mg/L	-	<0.1
> C10-C12 Aromatic	14	mg/L	-	81
> C12-C16 Aromatic	15	mg/L	-	550
> C16-C21 Aromatic	15	mg/L	-	440
> C21-C32 Aromatic	15	mg/L	-	5,700
> C6-C8 Aliphatic	0.2	mg/L	-	120
> C8-C10 Aliphatic	0.4	mg/L	-	39
> C10-C12 Aliphatic	8	mg/L	-	410
> C12-C16 Aliphatic	15	mg/L	-	2,400
> C16-C21 Aliphatic	15	mg/L	-	730
> C21-C32 Aliphatic	150	mg/L	-	14,000
Resemblance	-	-	-	WFO, LO

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels

2 = Modified TPH - Tier II does not include BTEX

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

WFO = Weathered fuel oil; LO = Lube oil fraction

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and lube oil impacts

Table 14.3 Results of Laboratory Analysis of PCBs in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Sample Depth (m)	Polychlorinated Biphenyls (PCBs)
	RDL	0.05/ 1 ²
	Units	mg/kg
	Criteria ¹	1.3
TEST PITS		
TP-140-BS1	0.2 - 0.3	0.07
TP141-BS1	0.1 - 0.2	2.4
TP142-BS1	0.2 - 0.3	<1 ²
BULK SAMPLES		
BS39	0.00 - 0.08	1.0
MONITOR WELLS		
MW21-SS1	0.00 - 0.08	1.1
MW24-SS1	0.00 - 0.10	0.87

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

2 = Elevated RDL

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

Shaded = Value exceeds applicable criteria

Table 14.4 Results of Laboratory Analysis of PAHs in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	RDL ²	RDL ³	Units	Criteria ^{1,3}	Criteria ^{2,3}	TEST PITS	MONITOR WELLS	
							TP141-BS1	MW21-SS1 ²	MW24-SS1 ³
Non-carcinogenic PAHs									
1-Methylnaphthalene	0.1	0.005	0.3	mg/kg	-	-	1.7	0.017	<0.3
2-Methylnaphthalene	0.1	0.005	0.3	mg/kg	-	-	1.1	0.035	<0.3
Acenaphthene	0.1	0.005	0.1	mg/kg	-	-	0.2	<0.005	0.4
Acenaphthylene	0.1	0.005	0.1	mg/kg	-	-	0.3	0.009	<0.1
Anthracene	0.1	0.005	0.1	mg/kg	2.5	-	<0.1	0.010	<0.1
Fluoranthene	0.1	0.005	0.1	mg/kg	50	-	0.2	0.040	<0.1
Fluorene	0.1	0.005	0.1	mg/kg	-	-	0.5	<0.005	0.3
Naphthalene	0.1	0.005	0.1	mg/kg	-	-	0.1	0.021	0.2
Perylene	0.1	0.02	0.1	mg/kg	-	-	0.1	<0.02	0.2
Phenanthrene	0.1	0.005	0.1	mg/kg	-	-	0.2	0.032	0.3
Pyrene	0.1	0.005	0.1	mg/kg	-	-	0.4	0.052	0.1
Carcinogenic PAHs									
Benzo(a)anthracene	0.1	0.02	0.1	mg/kg	-	-	0.2	<0.02	0.1
Benzo(a)pyrene	0.1	0.03	0.1	mg/kg	20	-	0.5	<0.03	0.4
Benzo(b)fluoranthene	0.1	0.04	0.1	mg/kg	-	-	<0.1	<0.04	<0.1
Benzo(k)fluoranthene	0.1	0.03	0.1	mg/kg	-	-	<0.1	<0.03	<0.1
Benzo(g,h,i)perylene	0.1	0.005	0.1	mg/kg	-	-	0.3	0.066	<0.1
Chrysene	0.1	0.005	0.1	mg/kg	-	-	0.9	0.046	0.4
Dibenz(a,h,)anthracene	0.1	0.005	0.1	mg/kg	-	-	<0.1	0.010	<0.1
Indeno(1,2,3-c,d) pyrene	0.1	0.005	0.1	mg/kg	-	-	0.1	0.037	<0.1
Benzo (a)pyrene TPE ⁴					-	5.3	0.602	0.034	0.480

Notes:

1 = CCME Canadian Soil Quality Guidelines for the Protection of Environmental Health at a

2 = CCME Canadian Soil Quality Guidelines for Protection of Human Health for a

3 = As per CCME recommendations, soil samples are compared against the SQG for the

4 = Carcinogenic PAHs Assessed as Benzo(a)pyrene Total Potency Equivalent (TPE)

5 - Elevated RDL(s) due to matrix interface

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

Shaded = Value exceeds applicable criteria

Table 14.5 Results of Laboratory Analysis of VOCs in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	Units	Criteria ¹	Criteria ²	MONITOR WELL
					MW24-SS1
1,1,1-Trichloroethane	30	ug/kg	-	-	<30
1,1,2,2-Tetrachloroethane	400 ³	ug/kg	-	-	<400
1,1,2-Trichloroethane	200 ³	ug/kg	-	-	<200
1,1-Dichloroethane	30	ug/kg	-	-	<30
1,1-Dichloroethylene	30	ug/kg	-	-	<30
1,2-Dichlorobenzene	30	ug/kg	-	1,000	<30
1,2-Dichloroethane	30	ug/kg	-	-	<30
1,2-Dichloropropane	30	ug/kg	-	-	<30
1,3-Dichlorobenzene	30	ug/kg	-	1,000	<30
1,4-Dichlorobenzene	30	ug/kg	-	1,000	<30
Benzene	30	ug/kg	30/11	-	<30
Bromodichloromethane	30	ug/kg	-	-	<30
Bromoform	30	ug/kg	-	-	<30
Bromomethane	200	ug/kg	-	-	<200
Carbon Tetrachloride	30	ug/kg	-	-	<30
Chlorobenzene	30	ug/kg	-	2,000	<30
Chloroform	30	ug/kg	-	-	<30
Chloromethane	30	ug/kg	-	-	<30
cis-1,2-Dichloroethylene	30	ug/kg	-	-	<30
cis-1,3-Dichloropropene	30	ug/kg	-	-	<30
Dibromochloromethane	30	ug/kg	-	-	<30
Ethylbenzene	30	ug/kg	82	-	<30
Ethylene Dibromide	30	ug/kg	-	-	<30
Methylene Chloride(Dichloromethane)	30	ug/kg	-	-	<30
o-Xylene	30	ug/kg	-	-	<30
p+m-Xylene	30	ug/kg	-	-	<30
Styrene	30	ug/kg	-	-	<30
Tetrachloroethylene	30	ug/kg	200	-	<30
Toluene	30	ug/kg	370	-	43
trans-1,2-Dichloroethylene	30	ug/kg	-	-	<30
trans-1,3-Dichloropropene	30	ug/kg	-	-	<30
Trichloroethylene	30	ug/kg	-	-	<30
Trichlorofluoromethane (FREON 11)	30	ug/kg	10	-	<30
Vinyl Chloride	30	ug/kg	-	-	<30

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland site, subsoil (2007)

2 = CCME Interim remediation criteria for soil that have not been replaced by Canadian Soil Quality Guidelines (1991)

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

**Table 14.6 Results of Laboratory Analysis of Available Metals in Soil - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103**

Parameters	RDL	Units	Criteria ¹	SURFACE SAMPLES		TEST PITS
				BS39	BS41	TP142-BS1
Aluminum	10	mg/kg	-	7,300	9,100	8,500
Antimony	2	mg/kg	20	67	120	2
Arsenic	2	mg/kg	12	15	9	<2
Barium	5	mg/kg	500	340	300	150
Beryllium	2	mg/kg	4	<2	<2	<2
Bismuth	2	mg/kg	-	<2	<2	<2
Boron	5	mg/kg	-	14	27	<5
Cadmium	0.3	mg/kg	10	5.4	5.6	0.8
Chromium	2	mg/kg	64	74	350	34
Cobalt	1	mg/kg	50	11	17	5
Copper	2	mg/kg	63	320	790	40
Iron	50/ 500 ²	mg/kg	-	100,000 ²	94,000 ²	10,000
Lead	0.5	mg/kg	140	2,100	1,900	51
Lithium	2	mg/kg	-	5	6	7
Manganese	2	mg/kg	-	660	470	95
Mercury	0.1/0.2 ²	mg/kg	6.6	0.7	0.3 ²	0.4
Molybdenum	2	mg/kg	10	10	12	<2
Nickel	2	mg/kg	50	63	110	17
Rubidium	2	mg/kg	-	8	5	4
Selenium	2	mg/kg	1	<2	<2	<2
Silver	0.5	mg/kg	20	1.3	0.9	<0.5
Strontium	5	mg/kg	-	22	46	10
Thallium	0.1	mg/kg	1	<0.1	<0.1	<0.1
Tin	2/20 ²	mg/kg	50	230	550 ²	18
Uranium	0.1	mg/kg	23	0.3	0.5	0.7
Vanadium	2	mg/kg	130	20	28	18
Zinc	5	mg/kg	200	1,300	1,700	160

Notes:

1 = CCME Canadian Soil Quality Guidelines for a Residential/Parkland Site (2007)

2 = Elevated RDL

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

Shaded = Value exceeds applicable criteria

Table 14.7 Results of Laboratory Analysis of TPH/BTEX in Groundwater - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	C ₆ -C ₁₀ (Gas Range)	C ₁₁ -C ₂₀ (Fuel Range)	C ₂₁ -C ₃₂ (Lube Range)	Modified TPH - Tier I ³	Resemblance
RDL	0.001	0.001	0.001	0.002	0.01	0.05	0.1	0.1	-
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	-
Criteria¹	1	20	20	20	-	-	-	20	-
MONITOR WELLS									
MW21	<0.001	0.002	<0.001	0.002	<0.01	0.06	<0.1	<0.1	DNR
MW21 Lab-Dup	<0.001	0.005	<0.001	0.005	<0.01	-	-	-	-
MW23	<0.001	0.005	<0.001	0.005	<0.01	0.18	0.4	0.6	OP F/L, LO
MW24	<0.001	0.004	<0.001	0.003	0.19	0.47	0.5	1.1	WFO, LO
MW24 Field-Dup	<0.001	0.008	0.001	0.007	0.18	0.73	0.9	1.8	WFO, LO

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable groundwater and coarse grained soil, lube oil impacts (September, 2003)

2 = Modified TPH - Tier I does not include BTEX

RDL = Reportable Detection Limit for routine analysis

Lab-dup = Laboratory duplicate sample

Field-Dup = Field duplicate sample

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

OP F/L=One product in fuel oil range; LO=Lube oil fraction; WFO=Weathered fuel oil fraction; DNR=No resemblance to petroleum products

Table 14.8 Results of Laboratory Analysis of TPH fractionation in Groundwater - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	Units	Guidelines ¹	MONITOR WELLS
				MW22
Benzene	0.001	mg/L	1	<0.001
Toluene	0.001	mg/L	20	0.005
Ethylbenzene	0.001	mg/L	20	0.001
Xylenes	0.002	mg/L	20	0.005
Modified TPH - Tier II ²	0.1	mg/L	20	59
> C8-C10 Aromatic	0.01	mg/L	-	<0.01
> C10-C12 Aromatic	0.01	mg/L	-	1.1
> C12-C16 Aromatic	0.05	mg/L	-	4.5
> C16-C21 Aromatic	0.05	mg/L	-	1.1
> C21-C32 Aromatic	0.1	mg/L	-	13
> C6-C8 Aliphatic	0.01	mg/L	-	<0.01
> C8-C10 Aliphatic	0.01	mg/L	-	0.03
> C10-C12 Aliphatic	0.01	mg/L	-	3.8
> C12-C16 Aliphatic	0.06	mg/L	-	12
> C16-C21 Aliphatic	0.06	mg/L	-	1.6
> C21-C32 Aliphatic	0.1	mg/L	-	21
Resemblance	-	-	-	FO, LO

Notes:

1 = Partnership in RBCA (Risk-Based Corrective Action) Implementation (PIRI) Tier I Risk Based Screening Levels (RBSLs) for a residential site with non-potable groundwater and coarse grained soil, lube oil impacts (September, 2003)

2 = Modified TPH - Tier I does not include BTEX

RDL = Reportable Detection Limit for routine analysis

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply

FO=Fuel oil fraction; LO=Lube oil fraction

Shaded = Value exceeds generic criteria for a residential site with non-potable groundwater, coarse grained soil and lube oil impacts

Table 14.9 Results of Laboratory Analysis of PCBs in Groundwater - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Sample ID	Polychlorinated Biphenyls (PCBs)
RDL	0.05
Units	ug/L
Criteria ¹	0.2
MONITOR WELLS	
MW21	<0.05
MW22	0.5
MW23	<0.05
MW24	<0.05
MW24 Field-Dup	<0.05

Notes:

1 = OMOE Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, Non-Potable Groundwater (2004)

RDL = Reportable Detection Limit

< # = Not detected above RDL noted

Table 14.10 Lab Analysis of Available Metals in Groundwater - POL Compound
Phase II/III ESA, HHERA and RAP/RMP
Former US Military Site and Residential Subdivision, Hopedale, NL
Project No. 121410103

Parameters	RDL	Units	Criteria ¹	MONITOR WELLS					
				MW21	MW21 Lab-Dup	MW22	MW23	MW24	MW24 Field-Dup
Aluminum	5	ug/L	-	155	154	101	83.3	289	289
Antimony	2	ug/L	16,000	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	2	ug/L	480	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Barium	5	ug/L	23,000	22.5	22.3	67.9	22	65.8	67.1
Beryllium	2	ug/L	53	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Bismuth	2	ug/L	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Boron	5	ug/L	50,000	<5	<5	14.4	7.1	10.2	12.8
Cadmium	0.017	ug/L	11	2.07	1.86	0.063	0.043	0.079	0.066
Chromium	1	ug/L	2,000	<1.0	<1.0	3.2	<1.0	1.1	<1.0
Cobalt	0.4	ug/L	100	2.32	2.25	0.55	1.42	4.06	4.06
Copper	2	ug/L	23	12.3	12.4	4.4	<2.0	4.3	4.4
Iron	50	ug/L	-	87	88	866	3,780	4,920	4,650
Lead	0.5	ug/L	32	<0.50	<0.50	1.16	<0.50	1.78	1.8
Manganese	2	ug/L	-	240	240	161	114	321	315
Molybdenum	2	ug/L	7,300	570	552	9.2	2.1	3.5	3.7
Nickel	2	ug/L	1,600	7.1	6.8	<2.0	2.3	3.9	4
Selenium	1	ug/L	50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	0.1	ug/L	1.2	0.13	0.12	<0.10	<0.10	<0.10	<0.10
Strontium	5	ug/L	-	62.6	61.1	41.6	27.2	30.9	30.1
Thallium	0.1	ug/L	400	0.23	0.22	<0.10	<0.10	<0.10	<0.10
Tin	2	ug/L	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	2	ug/L	-	8.1	7.6	3.6	<2.0	3.2	3.4
Uranium	0.1	ug/L	-	2.46	2.35	<0.10	0.13	0.36	0.36
Vanadium	2	ug/L	200	<2.0	<2.0	<2.0	<2.0	2.1	2.1
Zinc	5	ug/L	1,100	12.5	12.4	9.3	10.4	69.3	65.3

Notes:

1 = OMOE Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, Non-Potable Groundwater (2004)

RDL = Reportable Detection Limit for routine analysis

Lab-Dup = Laboratory duplicate sample

Field-Dup = Field duplicate sample

< # = Not detected above RDL noted

"-" = indicates value is not available or does not apply